| **Paper code: EE-602** | **Roll No.** | | | | | | | | | |
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# B.Tech.
## (SEM VI) EVEN SEMESTER EXAMINATION 2015-16
## SWITCH GEAR & PROTECTION

**[Time: 3 hrs.]** **[Max. Marks: 100]**

**Note:** Answer all five questions

**1.** Answer any four parts of the following:- **[5x4=20]**

(a) What is a zone of protection? Discuss various zones of protection in power system with the help of line diagram.
(b) What are the design considerations of electromagnetic relays? Also mention few of the desirable qualities of protective relays.
(c) Discuss about gas actuated relay in details.
(d) What are the functions of protective relay's. Can a relay also prevent a fault?
(e) What are primary and backup protection? Also compare them.
(f) How induction cup type construction is superior to the induction disc type?

**2.** Answer any two parts of the following:- **[10x2=20]**

(a) What is a distance relay? Draw its characteristics. How is directional features added with the over current relays? Why is it required?
(b) Draw the connection diagram of a differential relay for the protection. How does biasing the winding of a differential relay restricts malfunctioning of the relay against:
    i. CT mismatch
    ii. magnetising current
(c) Discuss about phase comparator and amplitude comparator in detail. What are the merits of static relays?

**3.** Answer any two parts of the following:- **[10x2=20]**

(a) What is carrier current protection? For what voltage/frequency range is it used for the protection of transmission line? With neat sketches discuss the phase comparison scheme of carrier current protection
(b) Discuss distance protection in detail. Write short note on auto reclosing.
(c) How is a bus bar protected?

**4.** Answer any two parts of the following:- **[10x2=20]**

(a) A circuit breaker is rated at 1500 amps, 3000 MVA, 33 kV, 3 sec, 3-phase, oil circuit breaker. Determine the rated normal current, breaking current, making current and short time rating (current).

(b) Discuss the principle of arc extinction in i) an oil circuit breaker and ii) air blast circuit breaker.

(c) Describe with the help of a neat diagram the procedure of testing a circuit breaker in a testing station.

**5.** Answer any two parts of the following:- **[10x2=20]**

(a) With the help of neat diagram, explain construction, operating principle and advantages of $SF_6$ circuit breaker.
(b) Describe the operating principle of D.C circuit breaker. Write short notes on:
    i) Current chopping
    ii) Interruption of capacitive current
(c) Give a complete protection scheme of alternator. What are the operating modes of circuit breaker?